

Docket No.: 4590-410

PATENT

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended): A method of producing a thick nonlinear optical grating $[(2)]$ with a thickness of several hundred microns from an initial thick nonlinear optical grating $[(1)]$, the thickness $[(E_2)]$ of the nonlinear optical grating $[(2)]$ being greater than the thickness $[(E_0)]$ of the initial nonlinear optical grating $[(1)]$, said initial grating comprising at least one plurality of mutually parallel plane layers $[(20)]$, said layers having at least two nonlinear coefficients having algebraically different values, said initial grating having a first face $[(11)]$ and a second face $[(12)]$ that are approximately parallel to each other and approximately perpendicular to the mean plane of the layers, and said second face $[(12)]$ being free, comprising characterized in that it comprises the following production steps:

$[\bullet]$ a first step of determining the thickness $[(E_{01}, E_{02})]$ of that upper part of the initial grating $[(1)]$ which lies beneath the second face $[(12)]$, which upper part has structural imperfections;

$[\bullet]$ a second step of polishing the second face $[(12)]$ of said initial grating $[(1)]$, making it possible to remove the upper part having said imperfections and to obtain a polished and plane third face $[(13)]$, said face approximately perpendicular to the mean plane of the layers $[(20)]$;

$[\bullet]$ a third step of cleaning and checking said third face $[(13)]$; and

$[\bullet]$ at least a fourth step of epitaxially depositing at least one layer $[(1a, 1b)]$ of material deposited on said third face $[(13)]$, the epitaxial growth reproducing, in said deposited layer, a structure similar to that of the initial grating, the combination of the initial grating $[(1)]$ and said deposited layer $[(1a, 1b)]$ constituting the nonlinear optical grating $[(2)]$.

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2. (currently amended): The method of producing an optical grating $[(2)]$ as claimed in claim 1, ~~characterized in that~~ wherein the means of determining the thickness having imperfections are optical display devices.

3. (currently amended): The method of producing a nonlinear optical grating $[(2)]$ as claimed in ~~either of the preceding claim[s]~~ 1, ~~characterized in that~~ wherein after the second production step, the thickness $[(E_1)]$ of the initial optical grating is at least 50 microns.

4. (currently amended): The method of producing a nonlinear optical grating $[(2)]$ as claimed in claim 1, ~~characterized in that~~ wherein the initial nonlinear optical grating $[(1)]$ is supported by a seed substrate $[(3)]$ having a lower face $[(14)]$ and a plane upper face $[(11)]$, the upper face $[(11)]$ of the seed substrate coinciding with the first face $[(11)]$ of said initial nonlinear optical grating $[(1)]$.

5. (currently amended): The method of producing a nonlinear optical grating $[(2)]$ as claimed in claim 4, ~~characterized in that~~ wherein the seed substrate $[(3)]$ comprises a crystalline material having a first crystal orientation, the upper face $[(11)]$ of the seed substrate having a thin structure, said structure being formed from a precursor grating of parallel bands of the same crystalline material but of the opposite orientation to that of the seed substrate $[(3)]$.

6. (currently amended): The method of producing a nonlinear optical grating $[(2)]$ as claimed in claim 5, ~~characterized in that~~ wherein the thickness of the seed substrate $[(3)]$ is at least 300 microns.

7. (currently amended): The method of producing an optical grating $[(2)]$ as claimed in claim 4, ~~characterized in that~~ wherein $[(the)]$ said second production step includes comprises the following preliminary steps:

- $[(\bullet)]$ a first preliminary step of polishing the lower face $[(14)]$ of the substrate; and
- $[(\bullet)]$ a second preliminary step of bonding at least said lower face $[(14)]$ to at least one plane support $[(32)]$, the fitting of the support making it easier to handle the initial optical

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grating ~~[[1]]~~ for the subsequent polishing operations.

8. (currently amended): The method of producing a nonlinear optical grating ~~[[2]]~~ as claimed in claim 4, ~~characterized in that~~ wherein the initial nonlinear optical grating ~~[[1]]~~ is obtained by the epitaxial growth method called HVPE (hydride vapor phase epitaxy) on the upper face of the seed substrate ~~[[3]]~~.

9. (currently amended): The method of producing an optical grating ~~[[2]]~~ as claimed in claim 1, ~~characterized in that~~ wherein the method of producing the initial nonlinear optical grating ~~[[1]]~~ ~~includes~~ comprises the following substeps:

[[•]] a first substep of producing a stack of crystalline plates ~~[[21]]~~ having plane parallel faces, of the same material, of small thickness and of periodically alternating crystal orientation; and

[[•]] a second substep of assembling said crystalline plates so as to obtain a single monolithic assembly ~~[[1]]~~ constituting the initial optical grating, said initial grating having a first face ~~[[11]]~~ and a second face ~~[[12]]~~ that are approximately perpendicular to the mean plane of the crystalline plates.

10. (currently amended): The method of producing an optical grating as claimed in claim 9, ~~characterized in that~~ wherein ~~[[the]]~~ said second step in the production of the initial grating ~~[[2]]~~ is preceded by the following preliminary steps:

[[•]] a first preliminary step of polishing the first face ~~[[11]]~~ of the monolithic stack; and

[[•]] a second preliminary step of bonding at least said first face ~~[[11]]~~ to at least one plane support ~~[[32]]~~, the fitting of the support making it easier to handle the monolithic assembly for the subsequent operations of polishing the second face ~~[[12]]~~.

11. (currently amended): The method of producing an optical grating ~~[[2]]~~ as claimed in ~~one of the preceding~~ claim~~[[s]]~~ 1, ~~characterized in that~~ wherein, during ~~[[the]]~~ said fourth ~~production~~ step, at least two layers ~~[[1a, 1b]]~~ of materials of different optical index are

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deposited so as to form an optical waveguide.

12. (currently amended): The method of producing a nonlinear optical grating ~~[[(2)]]~~ as claimed in ~~one of the preceding claim[[s]] 1, characterized in that~~ wherein during ~~[[the]]~~ said fourth ~~production~~ step, at least one of the layers ~~[[(1a, 1b)]]~~ is obtained by the epitaxial growth method called OMCVD (organometallic chemical vapor deposition) or by MBE (molecular beam epitaxy).

13. (new): The method of producing a nonlinear optical grating as claimed in claim 2, wherein after ~~[[the]]~~ said second ~~production~~ step, the thickness of the initial optical grating is at least 50 microns.